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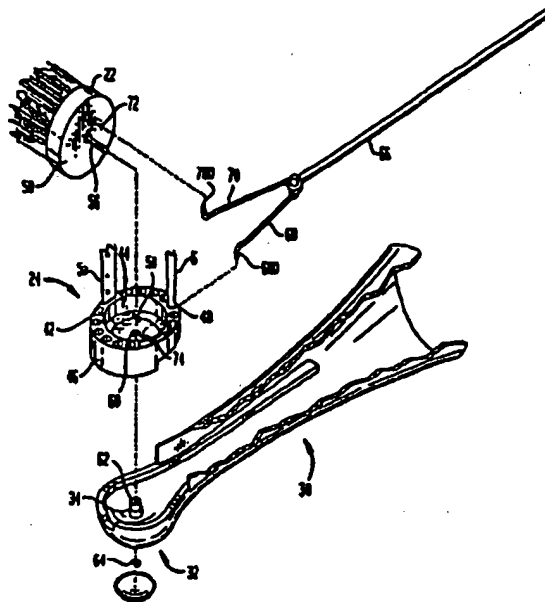
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- (71) Applicant: ADVANCED PROSTHETIC TECHNOLOGIES, INC. [US/US]; 14 Michael Drive, Metuchen, NJ 08840 (US). For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: BRUSH TIP FOR A MOTORIZED TOOTHBRUSH



(57) Abstract: A brush tip for a motorized toothbrush has a first brush head and a second brush head. The second brush head encircles the first brush head. Means are provided for differentially accelerating the first and second brush heads in response to motion produced by the toothbrush motor.

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## BRUSH TIP FOR A MOTORIZED TOOTHBRUSH

Background of the Invention

5 The invention relates to toothbrushes, and more particularly relates to powered toothbrushes. In its most immediate sense, the invention relates to a brush tip for a powered toothbrush of the type in which the motor moves a plurality of brush heads.

10 In a conventional motorized toothbrush of the multi-head type, a disposable brush tip is detachably secured to the handle of the toothbrush. The tip has a plurality of brush heads, which oscillate (as by rotation) under the power of the motor. Each brush head has a plurality of tufts of bristles.

15 Existing motorized toothbrushes have relatively small "coverage", i.e. they do not clean large surface areas at one time. This is because the brush heads are relatively small. If they are made too large, they will put an excessive load on the motor.

20 Furthermore, some users operate such toothbrushes improperly. Instead of applying only light pressure, they force the bristles hard against the teeth. Under such conditions, the distal end of each tuft of bristles stays in the same place and the tufts twist themselves tightly in alternate directions. This makes the brushing less effective, because the bristles do not scrub the surfaces of the teeth.

25 It would be advantageous to provide a multi-head motorized toothbrush that would have greater coverage than conventional toothbrushes.

30 It would also be advantageous to provide a multi-head motorized toothbrush that would perform better even when the user applies excessive pressure against the tooth surfaces to be cleaned.

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In accordance with the invention, a brush tip for a motorized toothbrush has a first brush head and a second brush head. The second brush head encircles the first brush head, and means are provided for differently accelerating the first and second brush heads in response to motion produced by the toothbrush motor.

Because the second brush head encircles the first brush head, the two head together have a relatively large area and, therefore, greater coverage. And, because the two brush heads are accelerated differently, their bristles do not twist themselves together even when pressed hard against the teeth.

In preferred embodiments, the first and second brush heads are accelerated in opposite directions, the first brush head is circular, and the second brush head is elliptical. The elliptical brush head provides greater coverage than a circular brush head and the opposite motions of the heads make it impossible for the bristles attached to the first brush head to twist into the bristles attached to the second brush head.

For toothbrushes of the type wherein the motor produces oscillating rotational motion of a shaft, a gear is mounted at the end of the shaft and is used to rotate the brush heads. For toothbrushes of the type wherein the motor produces reciprocating linear motion of an actuator, two connecting rods are used to convert this linear motion into oscillating rotational motion of the brush heads.

Although the second brush head is advantageously continuous, it need not be so. It may be made up of a plurality of segments thereby having one or more gaps.

#### Brief Description of the Drawings

The invention will be better understood with reference to the following illustrative and non-limiting drawings, in which:

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Fig. 1 illustrates a conventional motorized toothbrush with a brush tip of the single head type;

Fig. 2 illustrates how the bristles of the Fig. 1 toothbrush twist together when pressed against a tooth with excessive force;

Fig. 3 illustrates a preferred embodiment of the invention;

Figs. 4A and 4B are, respectively, a view of a part and an exploded view of a first preferred structure for the Fig. 3 embodiment, this being suitable for use with a motorized toothbrush of the linear motor type;

Figs. 5a, 5b, and 5c schematically illustrate the operation of the structure shown in Fig. 4; and

Fig. 6 illustrates the operation of a second preferred structure for the Fig. 3 embodiment, this being suitable for use with a motorized toothbrush of the oscillating motor type.

#### Detailed Description of Preferred Embodiments

In the following description, the same element is always indicated by the same reference numeral in all the Figures, and corresponding elements are indicated by primed reference numerals. The drawings are not necessarily to scale.

Turning first to Fig. 1, a conventional motorized brush tip generally indicated by reference numeral 2 has a brush head 4 on which tufts 6 of bristles 8 are secured. The brush head 4 is oscillated back and forth by a motor (not shown) while the user (not shown) brushes his or her teeth (not shown).

To use the toothbrush properly, the distal ends of the bristles 8 should not press hard against the surfaces of the teeth. Under such conditions, the bristles 8 scrub the tooth surfaces and remove food particles etc. therefrom. However, as can be seen in Fig. 2, some users apply an excessive pressure to the toothbrush, causing

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operation. In the preferred embodiment, this arc is 120°, but this is not part of the invention.

Fig. 6 shows an alternate structure, for use in instances wherein the motor (not shown) causes a shaft 80 to undergo rotational oscillation. In this structure, the first and second brush heads 22' and 24' have the same general shapes, but there are no connecting rods. Instead, toothed regions 50G and 58G are cut into the bottom surfaces 50' and 58', the shaft 80 extends through the slot 52', and a conical gear 82 at the distal end of the shaft 80 engages the toothed regions 50G and 58G.

It will be understood that the above description may not apply precisely to a production-engineered device. For example, although the surfaces 50, 58 are described as flat, they need not be precisely planar and may even be curved as long as the device as assembled works without excessive play or vibration. Likewise, although the connecting rods 68, 70 are advantageously straight, they may alternatively be slightly bent if this does not interfere with proper operation.

Although at least one preferred embodiment of the invention has been described above, this description is not limiting and is only exemplary. The scope of the invention is defined only by the claims, which follow:

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1 1. A brush tip for a motorized toothbrush, comprising:  
2 a first brush head;  
3 a second brush head, the second brush head  
4 encircling the first brush head; and  
5 means for differently accelerating said first and  
6 second brush heads in response to motion produced by the  
7 toothbrush motor.

1 2. The brush tip of claim 1, wherein said differently  
2 accelerating means causes the brush heads to rotate in  
3 opposite senses about a common axis of rotation.

1 3. The brush tip of claim 2, wherein the motorized  
2 toothbrush produces oscillating rotational motion of a  
3 shaft and said differently accelerating means transmits  
4 said motion to the first and second brush heads.

1 4. The brush tip of claim 3, wherein:  
2 the second brush head has a central well with a  
3 toothed region on the bottom surface and a peripheral  
4 wall with a slot therein, the slot extending generally  
5 parallel to said bottom surface;  
6 the first brush head is generally cylindrical with a  
7 toothed region on the bottom surface;  
8 the first brush head is located in said well; and  
9 the shaft has a conical gear at its distal end and  
10 extends into the slot in such a manner that the gear  
11 engages with the toothed regions on the first and second  
12 brush heads.

1 5. The brush tip of claim 2, wherein the motorized  
2 toothbrush produces reciprocating linear motion of an  
3 actuator and said differently accelerating means converts  
4 said linear motion into oscillating rotational motion of  
5 the brush heads.

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1 6. The brush tip of claim 5, wherein:

2 the second brush head has a central cylindrical well  
3 with a flat bottom surface and a peripheral wall with a  
4 slot extending parallel to said bottom surface;

5 the first brush head is cylindrical and has a flat  
6 bottom surface;

7 the first brush head is located in said well;  
8 and further comprising first and second connecting rods,  
9 each passing through the slot and connecting the actuator  
10 with a corresponding one of the brush heads.

1 7. The brush tip of claim 6, wherein each of the  
2 connecting rods has a hook that engages a corresponding  
3 recess in the bottom surface of a corresponding one of  
4 the brush heads.

1 8. The brush tip of claim 7, wherein both connecting  
2 rods are formed of a single piece of wire.

1 9. The brush tip of claim 1, wherein the first brush  
2 head is circular and wherein the second brush head is  
3 elliptical.

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1        10. The brush tip of claim 1, wherein the second brush  
2        head is continuous.

1        11. A brush tip for a motorized toothbrush, comprising:  
2        a first circular brush head;  
3        a second elliptical brush head, the second brush  
4        head encircling the first brush head; and  
5        means for rotating said first and second brush heads  
6        in opposite senses about a common axis of rotation in  
7        response to motion produced by the toothbrush motor.



FIG. 1  
(PRIOR ART)

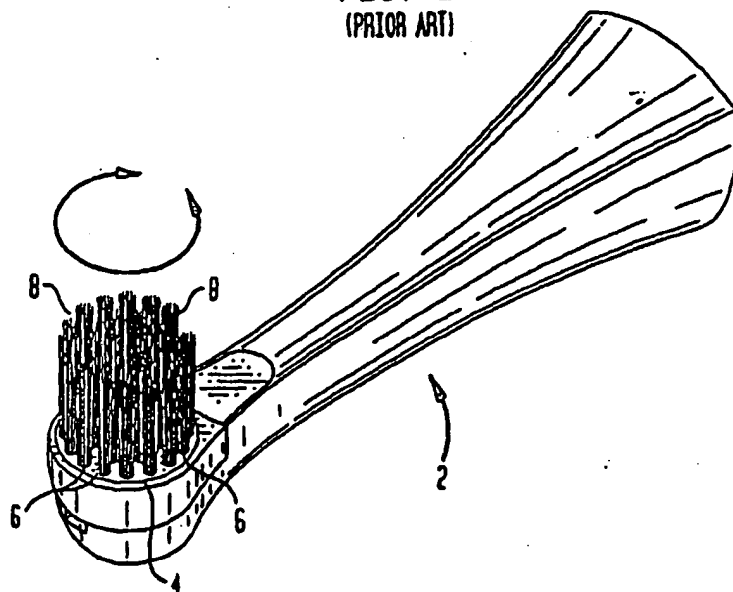


FIG. 2  
(PRIOR ART)

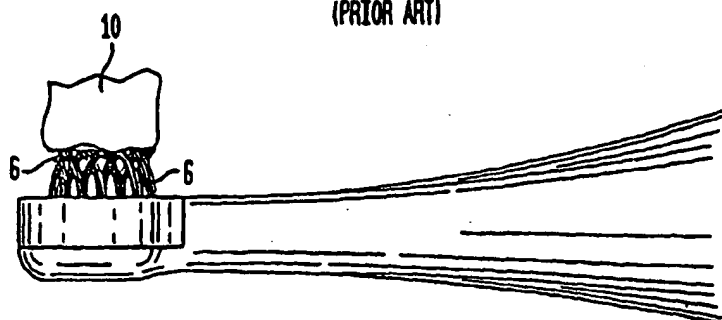


FIG. 3

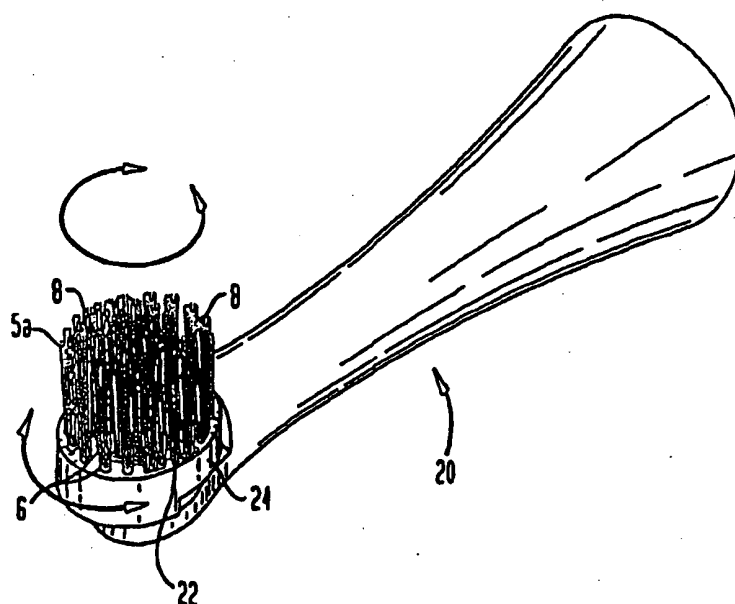


FIG. 4A

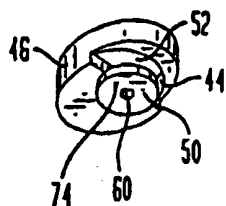
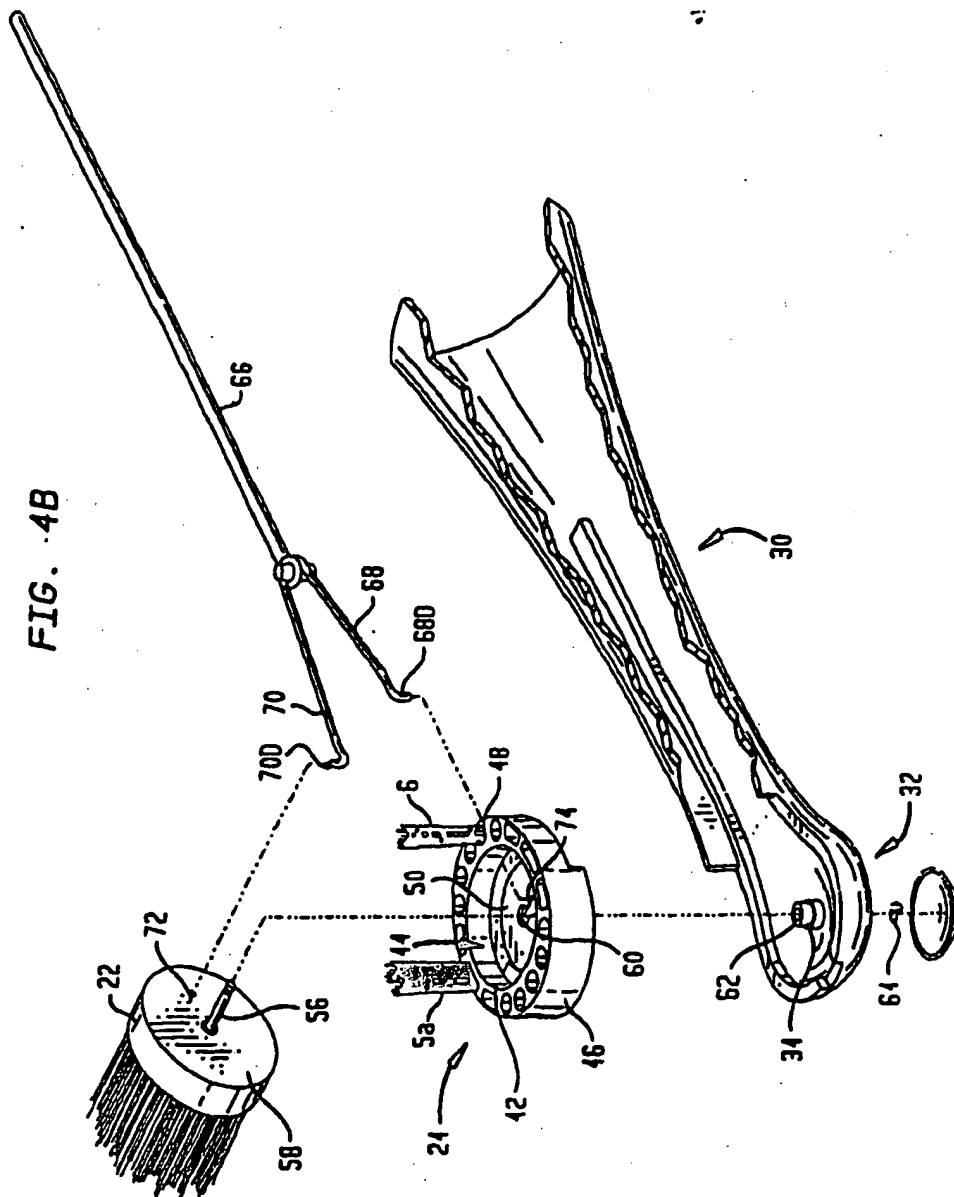
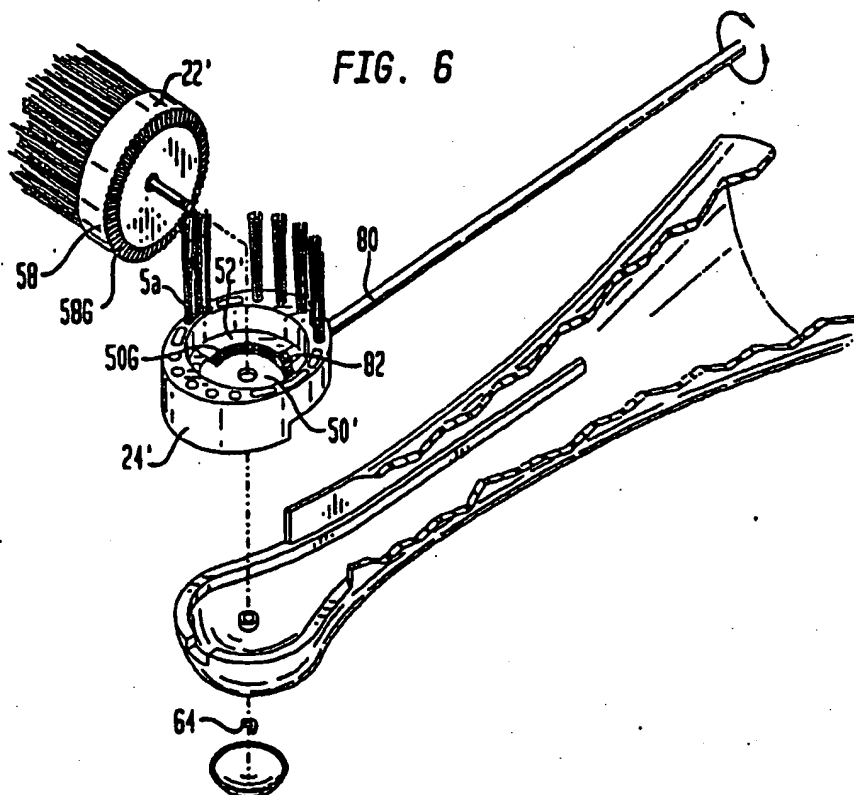
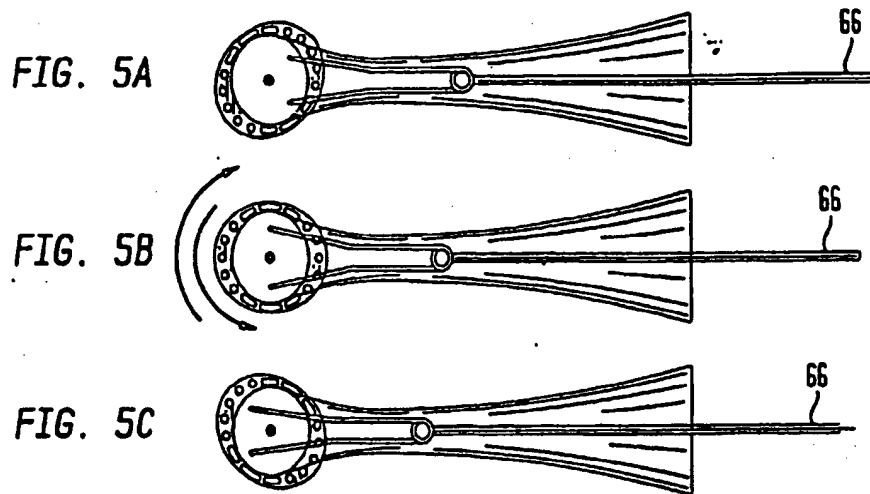


FIG. 4B





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